

Selective surface modification of PDMS microfluidic device for the generation of double emulsions

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The study presents simple and stable method for selective surface modification of hydrophobic PDMS microchannel using conjugation of sol-gel chemistry and photopolymerization. In details, the surface was modified with 3-(trimethoxysilyl)propyl methacrylate (TPM) and then reacted with hydrophilic acrylic acid monomer solution, which made selective covalent bonding between methacrylate groups and acrylic acids. The characteristics are investigated with various methods such as Fourier-transform infrared spectroscopy (FT-IR), and spatially selective immobilization of fluorescent dyes. We successfully use our proposed method to selectively modify the surface properties in certain areas of microchannel. Furthermore, our method efficiently produces monodisperse double emulsions and multiple emulsions containing various number of inner droplets.